

ENVIRONMENTAL Fact Sheet



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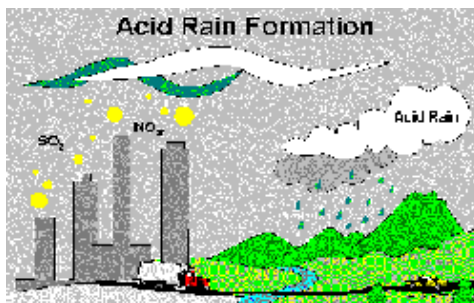
Acid Deposition

Impacting New Hampshire's Ecosystems

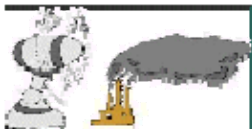
Acid deposition, more commonly known as **acid rain** (precipitation), is a complicated atmospheric process that has many direct and indirect environmental and public health impacts. The process begins when certain pollutants are released into the air. Once airborne, these gases react with other atmospheric constituents to form various secondary compounds, including acids. This process is dominated by nitrogen oxides and sulfur dioxide gas emissions which become sulfuric and nitric acids. The compounds are then carried through the atmosphere, sometimes over great distances, and are deposited to the earth when there is rain, snow, or fog. These same gases and particles can also be deposited by simply settling out of the air (known as dry deposition).

How does acid deposition occur?

Nitrogen oxides (NO_x) and sulfur dioxide (SO₂) emissions are released into the atmosphere by anthropogenic (man-made) and natural sources. SO₂ emissions are mainly produced as a result of burning fossil fuels (coal and oil) at power plants, with some emissions from natural sources such as volcanoes. NO_x emissions come from power plants, other combustion sources (boilers and furnaces), and cars, trucks and buses. NO_x and SO₂ chemically react in the atmosphere with water, oxygen and oxidants to form sulfuric acid (H₂SO₄), nitric acid (HNO₃), sulfate particles (SO₄), and nitrate particles (NO₃).



Meteorology is an important factor in the formation and transport of acidic compounds in the atmosphere. SO₂, NO_x and the resulting acidic compounds can remain in the air for long periods of time where they are subject to the prevailing weather patterns of the region. Prevailing wind flow from west to east means New Hampshire and New England are recipients of sulfuric acid, nitric acid, sulfates, and nitrates which originated as SO₂ and NO_x emissions from industrialized areas in the Midwest.



What are the environmental and health effects of acid deposition?

The impacts of acid rain and deposition are varied and often interrelated, creating complex and far-reaching consequences to aquatic and terrestrial ecosystems, visibility and public health.

- Acid precipitation can increase the acidity of lakes and streams by either passing through soils or falling directly on water bodies. Changes in the acidity of lakes and streams can impact the survival of fish and amphibian populations by impairing the ability of certain fish and water plants to reproduce, grow, and ultimately survive.
- Terrestrial ecosystems can also be altered by the increasing acidity of precipitation and heavy metal deposition. Acids strip forest soils of essential nutrients needed to sustain plant life. This process threatens the reproduction and survival of trees and other forest vegetation.
- Acid deposition of acidic particles are known to contribute to the corrosion of metals and to the deterioration of stonework on buildings, statutes, and other structures of cultural significance, resulting in depreciation of the objects' value to society. Acid deposition can also damage paint on buildings and cars, and soil buildings and other structures.
- Additionally, the same gases that cause acid deposition are responsible for the formation of small particles in the air that greatly reduce visibility and can adversely affect human health. Sulfate aerosol particles and, to a lesser extent, nitrate particles in the atmosphere produced from SO₂ and NO_x emissions account for more than 50 percent of the visibility reduction in the eastern United States and heavily influence concentrations of small particles or PM_{2.5}. These particles are small enough in size to be inhaled deeply into lung tissue, aggravating the respiratory and cardiopulmonary systems, especially in sensitive populations (people with asthma, emphysema, or other respiratory illnesses).

Is acid deposition still a problem?

Despite significant reductions of sulfur dioxide emissions in the United States and Canada, ecological indicators in soils, lakes and streams of New England and Eastern Canada have shown some improvement, but not enough for sufficient recovery of these ecosystems. This is linked to the combination of sensitive ecosystems and high rates of acidic deposition in this region. Furthermore, recent scientific studies indicate that decades of cumulative acid deposition impacts will likely take decades for ecosystem recovery. While significant reductions of nitrogen oxide emissions have taken place in New England in recent years, reductions in the United States and Canada as a whole have been minimal so far.



The EPA and Environment Canada, as well as scientists in this region, have concluded that significant additional reductions of both sulfur and nitrogen deposition are needed in order for ecosystems to continue their recovery. In an effort to protect public health and our natural resources, New Hampshire, participating with the Conference of New England Governors and Eastern Canadian Premiers (NEG/ECP), has become a signatory to the NEG/ECP Acid Rain Action Plan.

What can you do to help reduce acid deposition?

There are many things you can do to help reduce the emissions that cause acid rain and to protect New Hampshire's environment from the adverse effects of acid deposition. Here are just a few:

- Conserve energy – turn off lights, computers, and electric appliances when not in use.

- Purchase and use energy efficient appliances and motor vehicles.
- Advocate for emission reductions from power plants and more stringent national vehicle emission standards.
- Limit driving – ride a bike, car pool, and combine errands for fewer trips.
- Keep your car tuned-up and properly maintained – keep tires properly inflated.
- Help to monitor the quality of New Hampshire's lakes and rivers – participate in New Hampshire's volunteer lakes and river assessment programs.



For more information about acid deposition, contact the New Hampshire Department of Environmental Services Air Resources Division at (603)-271-1370.